FOLIAR FUNGICIDES FOR CORN

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Introduction

In 2007, fungicide use for U.S. corn production exploded. Based on discussions amongst Extension Plant Pathologist, it was estimated that approximately 10% of U.S. corn acres (approximately 9 to 10 million acres), were sprayed with a foliar fungicide during the season. Current demand for foliar fungicides has focused on products of the strobilurin (pyraclostrobin, azoxystrobin or trifloxystrobin) and/or triazole (propiconazole) classes (Boerboom et al., 2007). Our goal and objective in this paper is to summarize what was learned in 2007 regarding the use of foliar fungicides on corn, as well as some of the factors that need to be considered before making the decision to apply a foliar fungicide.

Regional Results

In the primary corn production region (North Dakota down to Kansas on the western edge across to Ohio on the eastern edge), the number of corn acres that were sprayed with a foliar fungicide ranged from about 175,000 to 200,000 in Missouri to 3,000,000 to 4,000,000 in Illinois (Munkvold, 2007). We estimated that between 400,000 and 500,000 acres were sprayed in Wisconsin, which was approximately 10 to 15% of the acreage.

University Corn Fungicide Trials: Data were obtained by Carl Bradley (University of Illinois, Department of Crop Sciences) for 13 states and provinces (including Wisconsin) where replicated fungicide trials were performed (Bradley, 2007). Results are summarized for specific questions of interest in Table 1 and these questions included the effect of fungicide product, the level of resistance to gray leaf spot (*Cercospora zeae-maydis*), and the previous cropping history. In all situations, the following assumptions were made regarding the economic profitability of using a foliar fungicide: (i) fungicide treatment (including application cost) was $20/acre and (ii) the market corn price was held at $3.50/bu. Based on these values, a minimum of a 6 bu/acre return was necessary for the foliar fungicide to be considered the breakeven point. In general, the percentage of trials where an economic return was found was less than 50%, except in the situation where a susceptible gray leaf spot hybrid was used. Also, an interesting result was the response to foliar fungicide was much lower for corn following corn, than for corn following other crops. Typically, the working hypothesis has been that foliar fungicides would be efficacious for situations with multi-year or continuous corn, and the 2007 results lead to many questions that will need to be addressed, including an important one regarding if a producer is less likely to get a yield response with corn following corn? Typically, the mean yield increased between 1 to 6 bu/acre, depending on question of interest (Table 1).

IPM and Foliar Fungicides

For producers considering the use of a foliar fungicide there are numerous factors that should be considered before making a decision to spray or not to spray. Following a good IPM approach, some of these include: (i) knowledge of the corn hybrid susceptibility, (ii) whether or not there is disease pressure at or around the VT growth stage, and (iii) what the previous cropping history

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and the amount of residue in the field was. For many foliar corn pathogens, yield loss has not been well documented, nor do we currently know to what extent the application of foliar fungicides benefit stalk rots.

When the decision has been made to apply a fungicide, it is critical to follow good farming practices. Always follow the label recommendation regarding application rates, timing, and use of adjuvant. Also, mix and alternate fungicides with different modes of action, because with such a substantial amount of the corn acreage receiving a fungicide from fungicide classes that are considered in the moderate to high-risk categories for resistance, the potential for corn pathogens to become resistant to foliar fungicides is legitimate.

Furthermore, as with any agricultural management tactic, the economic considerations using such a tactic should be considered. In Table 2, we present the estimated number of bushels required to make the breakeven point for applying a fungicide. To generalize, as market price increases, and application cost decreases, the estimated number of bushels required to breakeven is reduced. Using the current University trials and the mean yield return, profitable applications would occur when corn price is higher (e.g., in the $4/bu range) and fungicide and application cost (e.g., $20/acre or less) are lower.

References

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Table 1. Summary of University fungicide trials in 2007 (adapted from Bradley, 2007).

Fungicide and hybrid questions	Number of trials	Number with economic return	Percentage with economic return > 6 bu/acre	Mean yield increase (bu/acre)
Effect of Headline® †	89	39	44	4
Effect of Quilt®	37	13	35	3
Effect of Stratego®	42	11	26	2
Combined fungicides	168	63	38	3
Fair-to-poor resistance to gray leaf spot	31	16	52	6
Good-to-excellent resistance to gray leaf spot	121	47	39	3
Previous crop corn	68	19	28	1
Previous crop soybean, sugar beet, or wheat	51	21	41	5

† Headline was applied at 6 fl oz/acre; Quilt at 4 fl oz/acre; Stratego at 10 fl oz/acre.

Table 2. Estimated number of bushels necessary to break even for the application of a foliar fungicide in corn under different application and fungicide costs, and corn market value.

Application cost	Fungicide cost	Corn market value ($/bu)				
		2	2.5	3	3.5	4
6	10	8.0	6.4	5.3	4.6	4.0
	15	10.5	8.4	7.0	6.0	5.3
	20	13.0	10.4	8.7	7.4	6.5
	25	15.5	12.4	10.3	8.9	7.8
8	10	9.0	7.2	6.0	5.1	4.5
	15	11.5	9.2	7.7	6.6	5.8
	20	14.0	11.2	9.3	8.0	7.0
	25	16.5	13.2	11.0	9.4	8.3
10	10	10.0	8.0	6.7	5.7	5.0
	15	12.5	10.0	8.3	7.1	6.3
	20	15.0	12.0	10.0	8.6	7.5
	25	17.5	14.0	11.7	10.0	8.8
12	10	11.0	8.8	7.3	6.3	5.5
	15	13.5	10.8	9.0	7.7	6.8
	20	16.0	12.8	10.7	9.1	8.0
	25	18.5	14.8	12.3	10.6	9.3